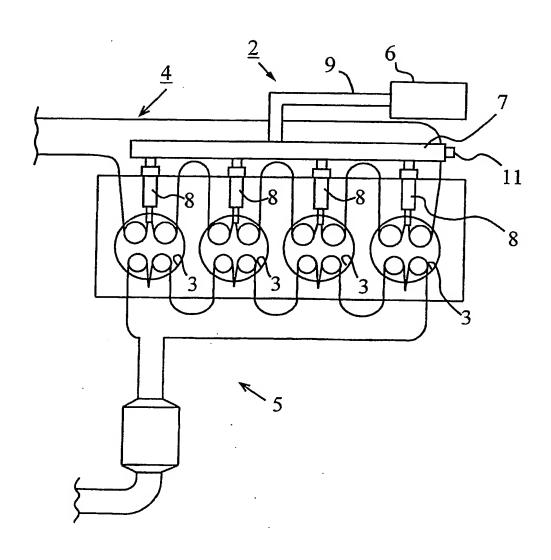
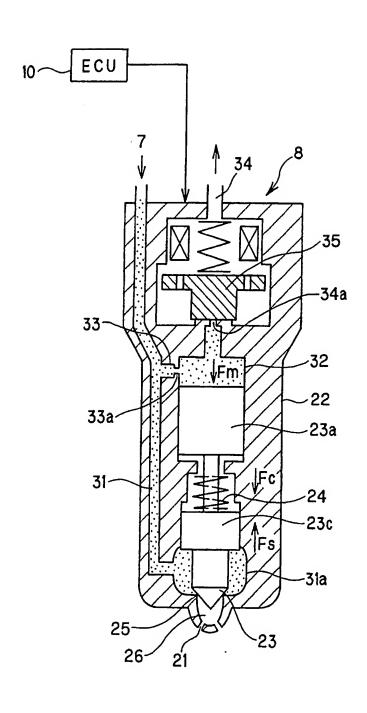
1/13

FIG. 1

1

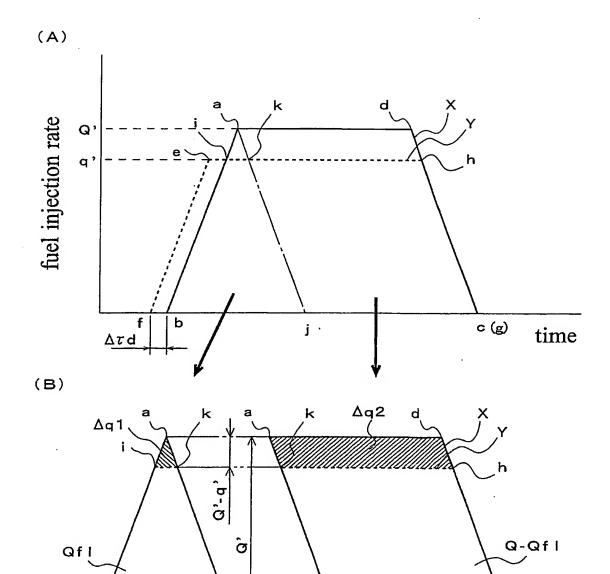


2/13 FIG. 2



3/13 fuel injection valve needle valve 23 ∞ coefficient calculation start time variation calculation means means 61 in-cylinder pressure detection means 28 control means 56 52 (fuel pressure detection means) F1G. 3 53 fuel injection rate calculation means fuel injection quantity variation 57 rail pressure sensor calculation means 51 calculation means time period comparison means characteristic storing means fuel injection quantity 9 quantity calculation means required fuel injection fuel injection quantity 59 estimation means 55

4/13 FIG. 4



\ X2

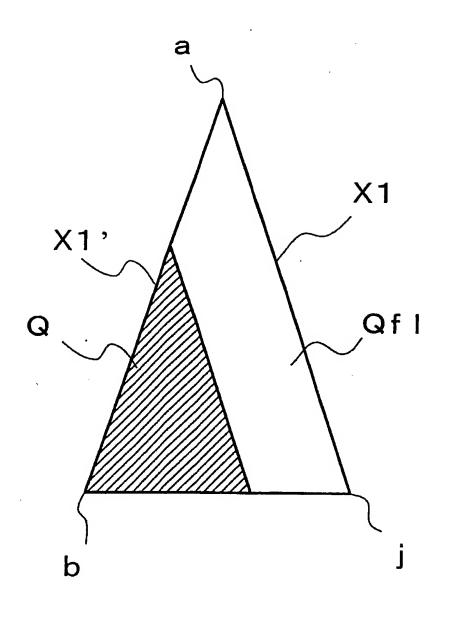
c (g)

(X1

j

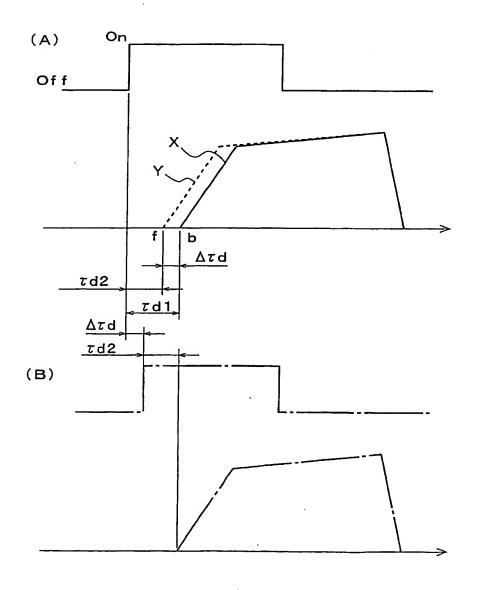
5/13

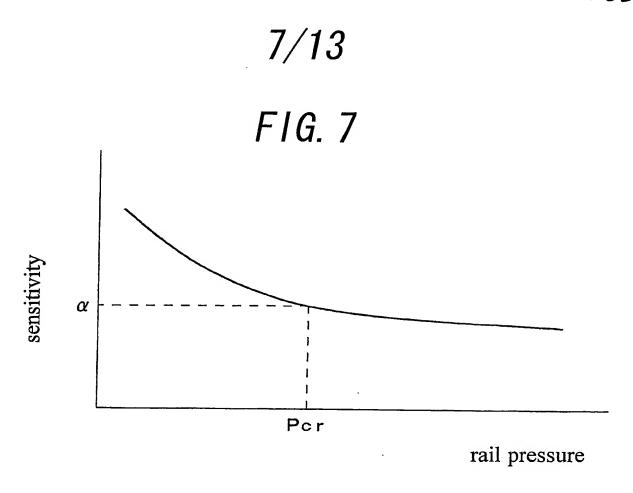
F1G. 5

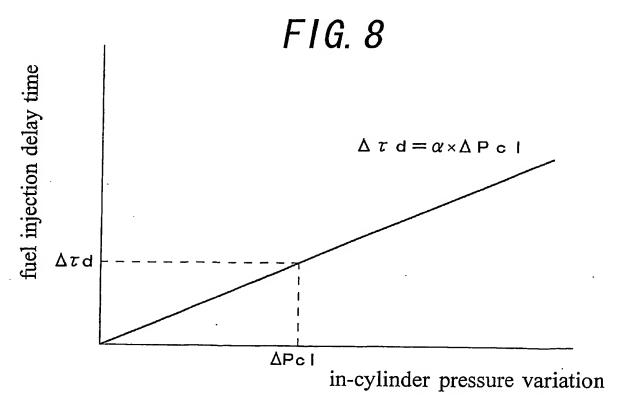


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FIG. 6

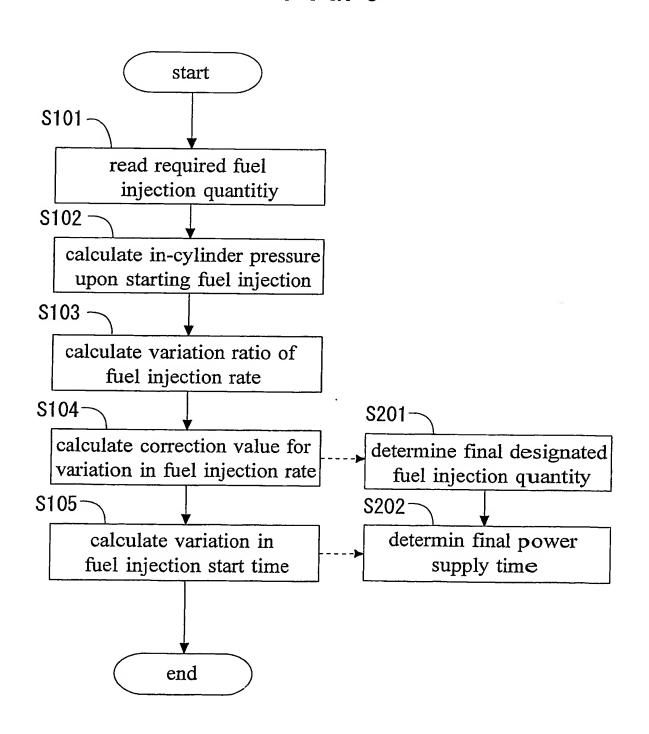






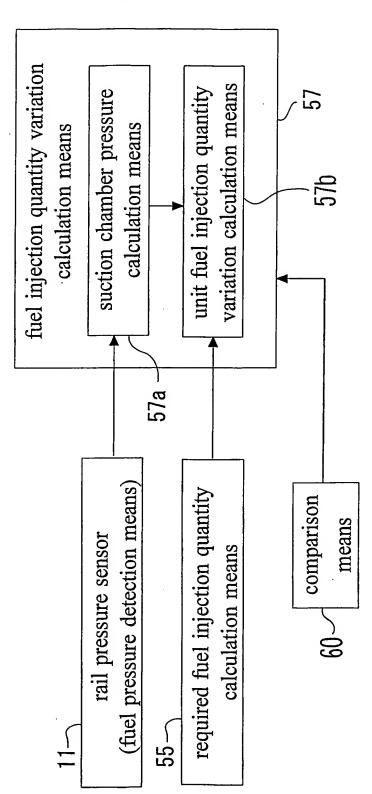
PCT/JP2004/014703 10/534863

8/13 FIG. 9



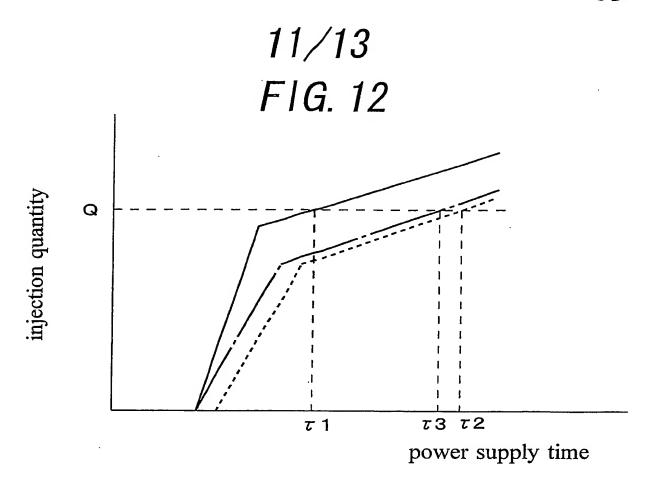
PCT/JP2004/014703 10/534863

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F1G. 10

10/13 fuel injection valve 99 needle valve 23 second virtual fuel pressure ∞ fuel injection delay time calculation means calculation means start time variation calculation means control means 52 F1G. 11 61 53 in-cylinder pressure detection means calculation means (fuel pressure detection means) time period rail pressure sensor characteristic storing means quantity calculation means first virtual fuel pressure fuel injection quantity required fuel injection calculation means 65 55 54



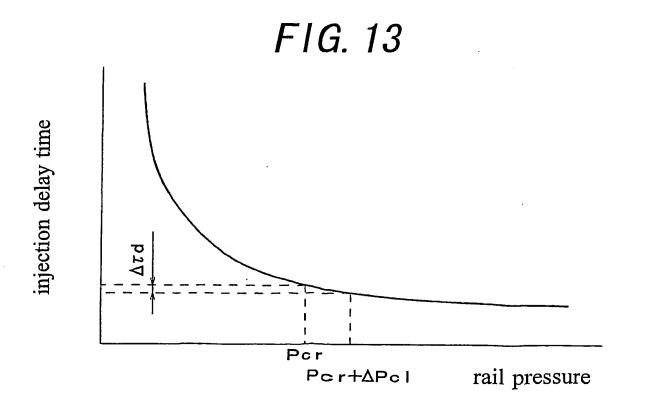


FIG. 14

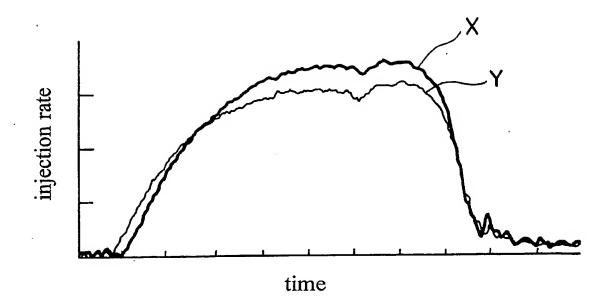


FIG. 15

